

SUPPLEMENT
TO THE
SANITARY REPORT
OF THE
PROVINCE OF ASSAM
FOR THE
YEAR 1913.

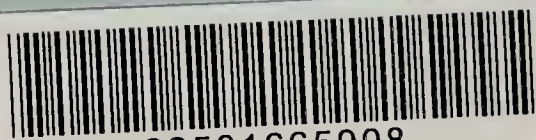


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1914.

Price 11 annas.]

[Price 1s.



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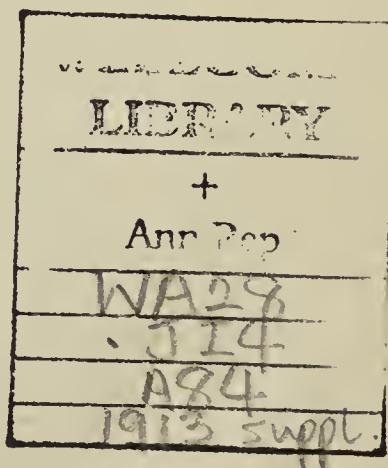
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REPORT ON THE *KALA-AZAR* SURVEY OF ASSAM DURING THE SEASONS 1912-13 AND 1913-14.

BY

MAJOR T. C. McCOMBIE YOUNG, M.B., Ch.B., D.P.H., I.M.S., DEPUTY SANITARY COMMISSIONER, ASSAM.

INTRODUCTORY.

One of the main problems of disease, with which the Sanitary Department in Assam has to grapple, is that presented by the presence throughout the province of scattered endemic foci of *kala-azar* which are the smouldering embers of the epidemic fire which ran through the greater part of the province in the eighties and nineties and was the cause of great loss of life and economic inefficiency.

It may be useful to recall some of the past history of that outbreak. This fever was first observed in the Garo Hills in 1869 and it was probably identical with the epidemic of Burdwan fever which devastated the Burdwan Division in the decade 1860—70, and the district of Rangpur in 1871—76. It was probably a late extension of that epidemic which had slowly crept round the barrier of the Garo Hills and Khasi Hills, having been imported from Rangpur.

The disease having thus obtained a footing in Goalpara, then spread up *via* the Grand Trunk Road, on the south bank of the river, through the subdivisions of Dhubri and Goalpara, to Kamrup, causing the heaviest mortality in Goalpara during the period 1882—87.

Kamrup on the south bank being infected, the disease then crossed to the north bank into Mangaldai of Darrang, and thence to Nowgong in 1890. Heavy mortality occurred, especially in the latter district, and by 1896 the disease had reached the narrow tract of sparsely-populated country which gives access to the more open, alluvial plains of the Golaghat subdivision and Upper Valley.

Here stringent measures to prevent infected persons traversing this tract of country were put in force, and the epidemic ceased and the Upper Assam Valley was saved from its ravages.

Meantime the disease in its epidemic form had declined almost to extinction in the parts first affected and, in 1901, it was considered that Goalpara and Kamrup were free from the epidemic except for a few chronic cases in parts of the district.

We may note, then, that the disease took from ten to twenty years to go through its epidemic cycle in a district, and that it spread as far as, and no further than, the Golaghat subdivision of Sibsagar.

As a measure of the disastrous effects of the disease, it may be noted that in Nowgong the fever death-rate rose from about 4,000 in 1891 by regular stages to 14,000 in 1897, and again declined to about 4,000 in 1902. It is calculated that one-third of the indigenous population, *viz.*, 54,000 persons, died out in this district during the epidemic decade and that $\frac{1}{5}$ th of the land went out of cultivation.

In the Surma Valley different conditions prevailed. Although a severe outbreak of fever, with a rise in the fever death-rate, occurred in 1897, following the earthquake, yet the fever death-rate fell to nearly normal proportions the following years, and the rise of 1897 was probably malarial in cause, therein differing from the 10 to 20 years wave-lengths of the epidemic curves in the districts affected by *kala-azar*. Furthermore, it had previously been shown that the disease was endemic in this district. The contrast between the heavy mortality caused by the disease in the Brahmaputra Valley and the lightness of its incidence in the Surma Valley is one which is very striking, and the explanation put forward by Major Leonard Rogers, I.M.S., is of importance and interest. In this connection he says—

The epidemic travelled through the virgin soil of the northern valley previously unaffected by the sporadic form of the disease and there found a population fully susceptible to its deadly influence and hence was able to work such terrible havoc.

If this view of the epidemic is correct, it is clear that unceasing vigilance must continue to be exercised to protect the unaffected upper part of the Assam Valley from the insidious extension of the disease, while a fresh outbreak may in the future be lighted up by some such extraordinary succession of unhealthy years as caused the spreading epidemic at the foot of the Garo Hills in 1875.

The subsequent history of *kala-azar* in the province has not been marked so far by any epidemic recrudescence, or epidemic invasion of hitherto unaffected country.

Prior to the commencement of this survey, officers of the Medical and Sanitary Departments had been reporting the existence of certain "areas" within which some still glowing embers, remnants of the epidemic conflagration, seemed to retain sufficient activity to attract attention. While there was no reason to believe that this increased attention was due to any tendency of the disease to again assume epidemic proportions, yet it had to be remembered that, as we have seen, the rate of kindling of the epidemic fires is very slow, and the time it takes to burst into flame is measured by years. Where in other parts of India the advent of plague or outbreaks of epidemic malaria are perils to be feared, in Assam, *kala-azar* is perhaps the greatest menace to public health, and the statement that a recrudescence of the epidemic of the eighties and nineties would be a disaster of the first magnitude to Assam, may be taken as axiomatic.

Prior to the commencement of the survey, the situation appeared to be, that in an unknown number of areas in the lower Brahmaputra Valley, and throughout the Surma Valley there are still glowing points of slow combustion endemic foci. In the Upper Assam Valley, which is the main centre of the important tea industry, there exists an indigenous population so far untouched by the endemic form of the disease, and hence presumably a rapidly combustible material for an epidemic fire, and that adjacent to this inflammable material there exists in Golaghat an area of combustion of not inconsiderable activity.

It appeared to be extremely desirable that we should know the exact extent to which the health of the province is tainted with the *Leishmania* infection and extremely important that we should ascertain the number and extent of these endemic areas. To do this a survey of the districts of the province known to be affected, has therefore been carried out.

A staff of Sub-Assistant Surgeons was set to work in each of the districts of the Garo Hills, Goalpara, Kamrup, Nowgong, Darrang, and also in Sylhet. The districts of Lakhimpur and Cachar and the subdivisions of Jorhat and Sibsagar of the Sibsagar district, together with the hill districts other than the Garo Hills, were excluded from the survey, as no foci of endemic disease were believed to be present in them. The survey of the Golaghat subdivision had already been completed.

The full staff employed on the survey was fourteen Sub-Assistant Surgeons and two Supervising Assistant Surgeons. The Sub-Assistant Surgeons were given a preliminary course of instruction in the symptoms of the disease and in the method of carrying out the survey.

Provided with a copy of the village census list of the area allotted to them, they were instructed to visit every village in their area, and make enquiries as to the presence or absence of *kala-azar* in it, and to take notes of all suspected cases found. Suitable returns for recording the results of their work were prescribed, and all villages reported to be infected, were visited by me or by one of my assistants, and the diagnosis verified, while the *bonâ fides* of the reports as to the absence of disease were carefully scrutinised.

Subsequent to the inception of this provincial survey, the arrival of Major Mackie, I.M.S., in the province, on behalf of the Government of India, enabled us to devote our energies solely to the practical public health aspect of the case and to leave the problems of research entirely in his hands. We endeavoured to assist his work by communicating to him any important information which came to light and by endeavouring to procure for him information which he required.

All the areas reported to be infected and a considerable proportion of the infected villages were visited by me in the course of the cold weather, and the existence of infection verified in all these areas by splenic puncture of selected cases. Reports as to the absence of infection were also verified in the large number of villages.

During the rains I toured by launch through the Sylhet district, and visited the infected areas, and verified as far as possible the absence of infection in areas reported to be free. As the result of my observations I put forward this report with a fair degree of confidence that it contains a good general estimate of the extent of the endemic foci of *kala-azar* in the province.

In supervising the work of my staff, my efforts were directed towards verifying their reports of infection of villages, or of absence of infection.

For this purpose I did not attempt to perform a large number of splenic punctures with the object of diagnosing every suspicious case seen, lest, on account of the unpopularity of the operation, I might prejudice the success of future preventive measures.

My aim was to satisfy myself of the presence of *kala-azar* infection and to perform a sufficient number of splenic punctures to establish the presence of the disease.

In doing so the method adopted was as follows :—

An all-glass hypodermic syringe, with several needles, was sterilised before going out for the day. A bottle of tinct. iodi. and one of liquid carbolic acid was carried, and a box of carefully cleansed slides.

When the confidence of the villagers had been obtained, in the course of palpation of spleens with the patients recumbent, tinct. iodi. was applied to the skin over the spleens of all examined. In a selected case with a hard spleen and no evidence of excessive blood deterioration a drop of carbolic acid was also rubbed into the skin over the area for puncture. When the skin over this area had become somewhat numb, a sterilised needle, carefully concealed in the hollow of the left hand, was rapidly plunged into the spleen and the patient's attention attracted elsewhere, while my assistant rapidly fitted the syringe to the needle, withdrew a drop or two of fluid and made the films. In most cases the puncture was thus accomplished without the patient being aware of any unusual proceeding. The patient was always cautioned to lie down for the rest of the day, and a dose of calcium chloride administered before leaving.

In this way punctures were performed with as little fuss as possible, and no bad results occurred.

I am indebted to Major Mackie for the details of this tactful technique of puncture.

I append a list of places in which splenic punctures were performed and *Leishmania* parasites obtained. In addition to the splenic punctures, a large number of peripheral blood films were made from suspicious cases with the object of eliminating, as far as possible, the confusion with malaria. In only a few of these suspicious cases were malarial parasites found after a search of a minimum duration of 15 minutes. In one peripheral blood film, a single *Leishmania-Donovan* body was found in a large mononuclear leucocyte.

Although nothing but a positive result from splenic puncture is of any certain value for the diagnosis of an early case of *kala-azar*, I found the following observations of some assistance in arriving at a conclusion without performing splenic puncture :—

I. In about 50 per cent. of the cases (see table), a previous history of deaths from *kala-azar* in the house could be elicited.

A positive family history is, therefore, a very strong point in settling a doubtful diagnosis.

II. In visiting a village reported to be infected, out of three or four cases seen one was commonly recognisable on clinical grounds. The presumption would then be strongly in favour of a diagnosis of *kala-azar* in the doubtful cases.

III. While malaria is very hard to differentiate from early *kala-azar* on clinical grounds, I noted that, if towards the end of the cold weather, one found a family of two or three children suffering from enlarged spleen with a history of infection during the preceding hot weather, and with a history of improvement of health in all cases instead of deterioration, one might assume that the infection was malaria and not *kala-azar*, in which disease the general tendency is towards death and not towards recovery.

In some doubtful cases of this nature, I found malarial parasites in the finger blood.

Other diseases which I found to be confounded with *kala-azar* are :—

I.—*Chronic dysentery.*

This is often the final stage in a *kala-azar* infection, as of other diseases, and hence the confusion.

II.—*Ovarian cyst.*

One such case was erroneously reported as *kala-azar*.

III.—*Splenic leukaemia.*

One such case came to my notice in the person of a male adult in the Nowgong district, who showed all the gross clinical signs of *kala-azar* emaciation, muddy complexion, anaemia, enlarged spleen and liver.

I noted some degree of dyspnoea at the time of examining him, a symptom not usually associated with *kala-azar*, and, on examining a film of his blood, found the field crowded with white blood cells.

SUB-ASSISTANT SURGEONS' REPORTS.

APPENDIX I.

The following figures and observations are available from the reports of the Sub-Assistant Surgeons and my own observations.

Sex incidence.—Out of 795 cases seen, 547 or 68·8 per cent. were males and 248 or 31·2 per cent. were females. While there is always a tendency to conceal the occurrence of the disease among native females, the age incidence table shows that nearly $\frac{3}{4}$ of the cases seen occurred during the first three quinquinnia of life, and at ages during which concealment of disease among females is not likely to affect the results very markedly. It appears from these figures that there is possibly a higher incidence upon males, than upon females, which is curious at ages when the habits of native children of both sexes are very similar; there is probably a fallacy in these figures, perhaps due to the greater timidity of female children.

Age incidence.—The figures show an increased incidence upon the age groups in the first four quinquinnia as compared with the figures given by Major Rogers in "Fever in the Tropics" for the Assam Valley during the epidemic years; 76·6 per cent. of the cases seen in this investigation were under 20 years of age, as against 50 per cent. in Major Rogers' report. It may be that the incidence of a less virulent type of the disease leads to its being confined within the limits of the age groups which are most susceptible to it. A further explanation of this special incidence may be found in the fact that a new and susceptible generation of children has sprung up since the disease in epidemic form first took its toll of life in the Assam Valley.

The age incidence seems to be approaching that seen in the *kala-azar* of the Mediterranean littoral.

Occupation.—87·2 per cent. of the cases seen, belonged to persons whose occupation was that of agriculture. This gives no indication of the relative numerical incidence upon different occupations, as the majority of the inhabitants of the province are cultivators.

From what I saw, however, I have no reason to believe that there is any special incidence upon classes of special habits of life, such as fishermen or traders, and I believe that the figure in question represents the fact that the bulk of those affected by the disease are agriculturalists.

Caste.—The figures showing the distribution by caste are not particularly informative, as they are calculated upon cases seen, and other things being equal, the most numerous castes will produce the largest number of cases, and only an analysis of the incidence in an infected area with different castes, living side by side, could produce figures of any value. The high incidence among Kacharis in Mangaldai, in the Gauhati subdivision and in Goalpara, is worthy of note.

Number of cases in which a previous history of kala-azar in the family was obtained.—This shows a total of 50·7 per cent. and varies according to different observers from 71 per cent. to 21·4 per cent.

It is curious that in the returns from the Eastern Circle of Nowgong district, which were obtained by a Sub-Assistant Surgeon who is an energetic and reliable worker, the number of infected families showing a previous history of disease in the family was 37·3 per cent. as against 65·4 per cent. in Mangaldai and 52·6 per cent. in Gauhati. According to my observations the disease appears to be most active in Eastern Nowgong and the difference in figures may possibly mean a more spreading type of disease.

House surroundings.—61·5 per cent. of the infected houses are shown as being situated in light jungle. This is, of course, typical of Assam conditions, 30·5 per cent. are situated near running water and 8·9 per cent. near tanks.

Drinking water.—40·1 per cent. get water from wells, 20·6 per cent. from tank and 34·0 per cent. from running water.

Domestic animals.—74·4 per cent. of infected families possess cattle, 51·0 per cent. keep fowls, 42·7 per cent. keep dogs, 37·2 per cent. cats, then follow pigs, goats and pigeons in a decreasing ratio. The comparatively small number of infected families which keep dogs seems to indicate that the dog is not concerned with the propagation of the disease in Assam, and this observation is in line with the research work of Donovan and Patton in Madras.

EVIDENCE OF VITAL STATISTICS, AND INCREASE OR DECREASE.

In the case of all the infected villages which I visited, I enquired into the past history of the disease in that village and in nearly all cases the answers were practically the same, *viz.*, that a large number of deaths had occurred during the earthquake epidemic, since when practically no cases had occurred until the last two years. There is undoubtedly a consensus of opinion, particularly in the Nowgong district, to the effect that in certain areas the disease is showing increased activity of late years.

To decide as to whether there is any basis of truth in these statements, I have prepared a statistical statement of deaths from *kala-azar* year by year for the last 20 years, district by district, and also circle by circle where such records are available in the office of the Sanitary Commissioner. During the 20 years under review the totals for the Assam Valley districts seem to have reached their lowest levels in the years 1908 and 1909, thereafter Goalpara shows an increase, the Garo Hills and Kamrup remains about the same level, Darrang shows a decrease, Nowgong an increase, Sibsagar a few cases, and Lakhimpur a few cases upon tea estates. There is no important change, therefore, in the general district mortality from *kala-azar*.

Scrutinizing the recent district returns in detail, in Goalpara, the Dudnai thana shows a marked increase. In Kamrup no substantial variation of increase or decrease has occurred in the last seven years. In Darrang, no material alteration has occurred, but the reported death-rate in the thanas of Mangaldai, Kalaigaon and Paneri is maintained at a uniformly high level.

The district of Nowgong shows a decided tendency to increase in the last two years. The mortality of 1913 is treble that of the year 1909 when the lowest point since the epidemic was reached.

Sibsagar shows a sudden increase in the Golaghat thana in the year 1911, when a hitherto neglected centre of *kala-azar* infection was recognised and deaths formerly registered as fever deaths were properly recorded. Lakhimpur shows no deaths from *kala-azar* in 1912 and one in 1913.

As the result of my observations, I am inclined to think that the popular ability to diagnose *kala-azar* is tolerably reliable. The people know the symptoms and appearance of the disease only too well.

The reason why the disease should have persisted in certain areas, and should have more or less died out of others in which during the epidemic years it was equally active, is a curious epidemiological fact that requires explanation. There is no apparent reason why this should be so, and the fact that determines it may be one of the factors in the causation of the disease at present unknown, or unproved. Possibly further research in these areas may discover this factor.

The extent to which such deaths appear in the returns may be questioned, but the error probably does not vary much from year to year.

Although the statistics do not show any disquieting increase in the number of deaths, I am inclined to think that the opinion of the villagers is correct, and that there is a tendency to an increase of the activity of the disease in certain areas.

If village statistics were available, this might be demonstrated by statistical methods, but these records are not to be had in our office. A point to be taken into account when considering statistical returns with regard to *kala-azar*, is the fact that it is a slow disease, and, in the form in which we see it at present, usually takes 1 year to 1½ years to kill its victims.

Any sudden rise in the number of infections will not affect the mortality appreciably until after the lapse of a year or more.

All that can be deduced from these figures is the general observation that we have not at present any statistical evidence of a general increased mortality from *kala-azar*.

MAP.

In the map submitted with this report I have shown the approximate position of villages which are believed to have contained cases of *kala-azar* at the time of the survey. It has not been found possible to depict on a small scale map the degree of infection of each village. A red dot may therefore mean one doubtful case, or a heavy infection. A reference to Appendix IV will show the degree of infection in each village.

DISTRICT RETURNS.—APPENDICES II AND III.

Garo Hills.—In so far as it was possible to survey this very jungly tract we have discovered only 8 villages suspected to be infected, all but two contain only one case and thus in all, only ten probable cases were discovered.

Other enquiries, made by me, tend to show that there is very little *kala-azar* in the Garo Hills, although possibly a few isolated villages here and there still suffer from the infection.

In the appendix to the Assam Sanitary Report of 1882 it is noted as follows:—

As far back as 1869, the attention of administrative officers in Assam became directed to a peculiar disorder called *kala-azar*, the ravages of which decimated, and in some instances almost depopulated, numerous districts in the Garo Hills. The disease is most intense where the low, densely-wooded Garo Hills join on to the low lying Central Assam plain, a position per excellence the most favourable for malarial developments. The Garos give definite accounts of the invasion of their villages by this epidemic at periods varying from 3 to 30 years previously.

The disease was known among the Garos as the “Sirkari” disease, owing to its appearance being contemporaneous with that of British rule. Gruesome tales are told of how on account of its recognised infectious character, infected persons were expelled from villages, and, stupefied with drink, were burnt alive.

The disease subsequently spread downwards into the Terai country at foot of the hills and thence into the Goalpara district.

The almost complete disappearance of the disease except in a scattered sporadic form is noteworthy when the past records of the disease in this district are examined, and it is interesting to note that in the tract of country in which it first appeared within the jurisdiction of Assam Administration, it is now almost absent.

Can a racial immunity have been acquired in the 50-60 years which seem to have elapsed since its first appearance?

Goalpara.—In Dhubri subdivision, only 16 infected villages have been discovered, and this subdivision is practically free from the disease.

In the Goalpara subdivision, the Dudnai thana contains 25 infected villages and Goalpara thana six. The centre of the infection is in Terai country situated at the foot of the Garo Hills in a comparatively circumscribed area.

Past history.—It appears from the past records of the disease that during the decade 1881—1891 when this district suffered from the epidemic, the Sadr subdivision was little affected, but that the Goalpara subdivision lost something like 18 per cent. of its population during this decade. In 1883 the incidence was greatest in the portion of Goalpara at the foot of the Garo Hills, relief works were started in 1883 and 4,919 cases were treated.

The agglutination of the endemic disease round this Damra centre is curious. The Lakhipur thana to the west contains only one infected village, while to the east there are no connecting links with the endemic centres in Kamrup.

Kamrup.—Seventy-four villages are reported to be infected in the Gauhati subdivision, and many of them contain a fair number of cases.

The tendency to cling to villages in Terai country is particularly noticeable in this subdivision and is better shown upon a large scale map which indicates the presence of low foot hills.

Gauhati town contains some cases, and in its neighbourhood are some infected villages. On the north bank the large Barpeta subdivision contains 9 infected villages and none badly infected. The Rangiya area, already reported on by Captain Harnett and visited by Major Mackie, is an area in which the disease appears to be tending towards extinction rather than towards increased activity.

North Kamrup contains 33 villages reported to be infected, many of these contains only one doubtful case and few are badly infected.

Past history.—In the epidemic, the incidence was chiefly upon the south bank. It is interesting to note that Barpeta, which suffered severely, is now almost free.

With reference to these two districts, one would feel inclined to assume that the disease is associated with the proximity of low-jungle-clad hills rising out of rice land. This observation is not, however, borne out in other districts.

Darrang.—Tezpur subdivision.—There are only two villages which are certainly infected, and 14 which contain one or two very doubtful cases. The infection has practically died out of the Tezpur subdivision.

Past history.—I am unable to trace any records as to the past infection of Tezpur subdivision, except from the statistics quoted, which showed a small *kala-azar* mortality in 1896.

In Daogaonpukuri, which is one of the two undoubtedly infected villages, the people state that during the epidemic of *kala-azar* the victims died almost as suddenly as in cholera epidemic.

The general opinion in the district is that *kala-azar* has almost disappeared. The people questioned the Sub-Assistant Surgeon closely as to why Government were troubling about it now when it has disappeared instead of when it was rife. The Sub-Assistant Surgeon who surveyed this subdivision notes that the people informed him that during the time of the epidemic, bed bugs were unusually prevalent. I had not suggested any question on these lines, and the statement was not prompted by a leading question. I simply record the observation without further comment.

In my opinion, the subdivision is practically free from the disease except for a few chronic and sporadic cases.

Nowgong.—In this district 86 infected villages were discovered by my staff.

Some additional information is also available through the kindness of Major Mackie who has been conducting research work in this district and has been able to carry on my preliminary investigation in greater detail. A number of additional villages have been reported to be infected in returns submitted by mauzadars. I have excluded these from my list of infected villages, to which I have however added seven villages considered by Major Mackie to contain the infection.

Although the actual number of infected villages in Nowgong is less than in Mangaldai, the type of case seen is undoubtedly more acute and the number of cases per village is greater and comparatively few villages contain only one single doubtful case. More cases of an unmistakable character could be discovered in infected villages in Nowgong than elsewhere. I base this statement on my own observations made in the course of my visits to infected villages. It would not be legitimate to attempt to show a comparison of the number of cases discovered per village in the different districts as a measure of comparative intensity of infection, as the observations were made by different observers.

The incidence of the infection is greatest upon the more populous area of country on the banks of Kallang and the eastern portion of the district is the most seriously infected. The western portion is comparatively free.

Past history.—The district was attacked in 1889, and suffered the most of all the districts in Assam. In 1894 the disease reached its furthest limit at Silghat and Joklabandha.

It is noteworthy that the description of the areas affected as given by Major Leonard Rogers in his report, is almost an exact description of the distribution of the disease as it exists to-day.

No description of the condition of affairs in the Nowgong district is complete without a mention of the somewhat disturbing fact that the people themselves are convinced that the disease has begun to increase of late years. I have dealt with this observation in my remarks regarding the vital statistical returns which seem to indicate that this popular opinion has some basis in fact.

Sibsagar.—The infected area in this district was surveyed prior to the commencement of the general survey but upon the same lines.

To complete the report upon the distribution of *kala-azar* in the Assam Valley, I include the following information gathered from my last inspection of the preventive operations we are conducting there.

Eight villages are infected in the Golaghat subdivision.

The infection is dying out of the village of Khumtai, in which it was first discovered, and is more active in the infected villages towards the east in the Nahorahi mauza, on the banks of the Kakodanga river.

The preventive measures we have undertaken there are proving successful but no relaxation of our grip of the disease here on the margin of previously uninfected country should be permitted.

Past history.—There is nothing in the records of the Sanitary Department to show that the disease had reached the Sibsaigar district until 1911 when its presence was recognised. It had, however, almost certainly been imported many years previously. Any extensive importation of infection during the epidemic years had been prevented by measures of exclusion of infected immigrants.

Upper Assam Valley.—No *kala-azar* infection is believed to exist east of the Kakodanga river, in the Jorhat or Sibsaigar subdivision or in the Lakhimpur district. The medical and vaccination staff have been asked to exercise vigilance as to this and to bring to the notice of the Civil Surgeon and Sanitary Department any suspicious cases that may come to their notice.

This caution will be re-issued by circular at intervals, to make sure that it is not lost sight of.

No cases except 49 cases upon tea estates in Lakhimpur in 1910 and in 1911 have come to light, and we are probably justified in assuming that the Upper Valley is still free from infection.

My conclusions are as follows :—

In the following areas the disease exists in endemic form and shows activity.—

- (1) In the Nowgong district.
- (2) In the Mangaldai subdivision.
- (3) In the Dudnai thana of Goalpara district.
- (4) In the Gauhati subdivision.

It exists in a few villages but in a quiescent state—

- (1) In the Barpeta subdivision and in North Kamrup.
- (2) In Tezpur subdivision.
- (3) In Dhubri subdivision.
- (4) In Goalghat subdivision.

In the Nowgong district, there is undoubtedly some activity in the disease, which is attacking the young and susceptible population of children which has sprung up since the earthquake epidemic.

European residents in the Nowgong district have noticed a large increase in the number of children in Assamese villages of late years. The activity of the disease is not confined to any particular centre but is widely spread throughout the eastern half of the district. The situation is more serious in Nowgong than elsewhere on account of the economic importance of the district, its proximity to the uninfected districts of the Upper Valley and the greater activity of disease. In Mangaldai, the conditions are somewhat similar, but the activity is not so great.

In the Goalpara and Gauhati subdivisions there is a fair amount of disease, but of a more chronic and less spreading type than in Nowgong. In Tezpur, Barpeta and Dhubri there are only a few sporadic cases scattered here and there, and there is no tendency to activity or to agglutination of the disease round centres.

The Rangiya centre in Kamrup shows no signs of activity.

A preliminary survey of the district of Sylhet was carried out under the Civil Surgeon, Major Scott, I.M.S. I have nothing to add to the subject-matter of his paper which appears in this supplement except to record my agreement with the accuracy of the observations made in the course of the investigation carried out under him by Sub-Assistant Surgeon Kamini Kumar Chakravarty. In continuation and in amplification of that survey, six Sub-Assistant Surgeons, provided with country boats, were at work in this district for six months during the rainy season of 1913, under my directions and under the immediate supervision of an Assistant Surgeon, and towards the end of this period I visited by launch all the areas reported to be infected and most of those reported to be free and satisfied myself that the reports of my staff were substantially correct.

My own observations showed that many of the isolated cases of village infection reported by Sub-Assistant Surgeon Kamini Kumar Chakravarty were not cases of *kala-azar*, although they had probably been diagnosed as such on account of the presence of *kala-azar* in that village in the past. No additional infected villages were discovered. Cases of *kala-azar* are to be found in villages round Chhatak, Sunamganj, Jaldhup and Nabiganj, but in these areas the disease is not nearly so active, nor are the infected persons so numerous, as in the infected areas in the Assam Valley. The remainder of the district is free from the disease, indeed it has died out in places in which it formerly existed. In my opinion *kala-azar* is of no practical importance in the morbidity of the Sylhet district and requires no special measures of observation or control.

Recommendations.—The following recommendations have been made to Government. On account of the number of endemic centres we have discovered, and their widespread distribution, any attempt to meet the disease by measures similar to those we have put in force in Golaghat could only be done by a staff, and with an expenditure, comparable to that required by the Plague Department in the Punjab or United Provinces.

The indefinite nature of our knowledge as to the mode of the transmission of the disease, and the want of any remedy to cure it, make it very difficult to frame a plan of campaign which would have sufficient certainty of success and be sufficiently far removed from the experimental stage to justify the very large expenditure which operations on a large scale would involve.

Furthermore, it is not by any means certain that there is a definite probability of the disease spreading to areas other than those in which it now exists, and it may be that the present sign of activity in certain areas are only temporary exacerbations which may again abate. This we can only determine by watching the course of disease. We should also endeavour to limit its spread from these areas and to prevent any diffusion of the infection into areas at present unaffected.

For the first purpose, that of watching the course of the disease, Sub-Assistant Surgeons should be put on duty to tour in the infected areas. Allowing a week to each village, then about 50 villages should be visited in the course of a year. On this basis and with due regard to the area to be covered, one man may be allotted to Dudnai thana and adjacent infected areas in the Kamrup district, a second for the balance of the Kamrup district, a third for the infected areas in the Mangaldai subdivision, which, although it contains a large number of villages, may be covered by one man, as the infected villages are many of them very near each other.

A fourth and a fifth must be assigned to Nowgong on account of the large area to be covered, and the large number of cases. A sixth should be put on duty in the Sibsagar district to supervise the more active measures of prevention which we propose to continue there on account of the proximity to uninfected territory, or to tour through uninfected country and keep us informed of the continued absence of infection.

The Sub-Assistant Surgeons should be provided with the complete equipment of travelling dispensaries and it should be their duty to tour in the infected area, visiting all villages in the area allotted to them, gaining the confidence of the people by treating their ailments, and submitting regular reports to the Sanitary Department. This organisation should be independent of the general scheme for travelling dispensaries and should be directly under the control of the Sanitary Department.

To get a good class of men for the appointment the scale of pay should be liberal and the appointment should be made for three years.

Under their supervision certain villages in these areas which prove to be badly infected might be encouraged to move to new sites, and practise the modified measures of segregation, with help from Government, as already carried out in Golaghat. In this way we can keep informed as to the increase or decrease of *kala-azar* in these areas, and afford the people some degree of help in their trouble.

These measures have been approved, the appointments sanctioned and the travelling dispensaries will be in the field at the commencement of the coming cold weather.

At the same time, however, we must not forget to safeguard the interest of the unaffected population and measures for this purpose are required to prevent the possible spread of the disease and the following measures are under consideration:—

Measures of Control.—It appears that the propagation of *kala-azar* is in this way.

An area gets infected by importation. The infection spreads and a panic is established. Infected families who have lost one or two of their number and see others dying, decide to migrate elsewhere to an uninfected area. They do so, if unchecked, taking with them an infected person, or the seeds of the disease. This leads to the propagation of the disease in this area and the process then repeats itself.

The people themselves are well acquainted with this and will often refuse to allow an infected family to enter their village, or to permit a member of an infected family to enter another by marriage. Petitions have been received by me and by my staff to have infected families removed from the proximity of others.

It is pretty generally acknowledged that the Upper Assam Valley was saved from infection because immigrants were refused admission to Golaghat during the epidemic.

It must be remembered that with the increase of railway communications, it is much easier for people to migrate now than formerly, and hence it is more easy to spread infection. To deal with this we should control migration from infected areas and give villagers the right to refuse admission to an infected person. This can be done by applying the Infectious Disease Act (Act III of 1897) to *kala-azar* as a preventive measure for Assam.

Certain villages should from time to time be notified under this Act as villages from which unsupervised immigration should not be permitted.

Any one who asks permission to migrate from such villages, *i.e.*, to change his domicile by removing his family and household goods to an uninfected area, should not be permitted to do so unless with a clean bill of health for the family. This would be granted by the Sanitary Department on the report of the Sub-Assistant Surgeon in charge of the *kala-azar* travelling dispensary in that area. The District Executive

Officers would make themselves responsible for the enforcement of this through the gaonburas and mauzadars. Lists of these notified villages should be circulated to all district officials and uninfected villages should be informed of the right to refuse admission to intending immigrants not possessing a clean bill of health.

I have discussed this proposal in all its bearings with Assamese gentlemen and officials, and they all agreed that no undue hardship would be involved in it, and that no opposition would be raised by the people, who understand the meaning of it and already themselves practice these measures. It is understood that no person has the right to exercise personal liberty of action to the detriment of others in the community even though the loss of such liberty may involve some hardship to the individual. It is, however, recognised that careful supervision by superior officers would be necessary to prevent this measure being used as a means of oppression by venal minor officials. With the staff I have proposed it should be possible to do this, and it would not likely be necessary to notify any large number of villages unless the seriousness of the present situation were to become intensified by a further increase in the activity of the disease. Such notified villages should receive particular attention from the travelling dispensary and should be offered substantial assistance in carrying out measures of segregation and removal, to compensate them for the slight hardship involved in prohibition of migration.

It is important to note that this suggestion was put forward by Major L. Rogers as one of the recommendations based upon his exhaustive investigation, and embodied in his report in 1897.

His idea in advocating it was with the object of legalising the expulsion from non-infected villages of infected immigrants. I consider that a further step, and one likely to lead to the least hardship will be to prevent the emigration of such infected persons at all.

The power of expulsion should be specifically included in the powers conferred by the Act, for I believe that the application of this Act in this manner is proving of considerable value in dealing with plague in the Punjab where it has enabled uninfected villages to refuse admission to suspected persons. A knowledge of the powers so conferred would be disseminated by the touring Sub-Assistant Surgeons whose appointments I have proposed.

In view of the somewhat disquieting tendency to increased activity in the Nowgong district, as shown by the steady increase in the mortality since 1909, and the somewhat active type of disease found in the district, I consider that there is distinct cause for action on these lines.

Need for continued research work.—While putting forward these suggestions for observation and control of the disease, I cannot emphasize too strongly the need for further research into the causation and treatment.

Without precise knowledge as to the causation of the disease and in the absence of a reliable remedy for its treatment, it is impossible to lay our axe at the root of the evil.

The absence of a remedy makes preventive measures extremely difficult, the people want a cure for the disease, and if we cannot offer this, our measures of segregation and prevention meet with little success.

The importance of medical science in the face of this scourge, and our inability to do more for its unfortunate young victims than to offer them quinine on the chance that possibly our diagnosis is wrong, and that the complaint is malarial, makes it a trying experience to see much of this disease for any lengthy period.

In conclusion, I have to acknowledge the assistance I received from Assistant Surgeon Bidyananda Dutta in commencing the survey, whose previous experience of similar work in the Golaghat subdivision was of great practical value, from Assistant Surgeon Sudhir Ranjan Bhattacharji in supervising the Sylhet portion of the survey, and particularly from Assistant Surgeon Suresh Chandra Mazumdar, whose cheerfulness and personal activity in spite of the not inconsiderable discomforts which have attended the supervision of this survey, has added to the value of his work in assisting me.

APPENDIX I.

| Sub division. | Sex. | | | Age group. | | | | | | Occupation. | | | Caste. | | | | | | | | | | | | | | | | | | | | | | | | | | Number of cases in which previous history of kaposi in the family was obtained. | Number showing | | | | Number in close neighbourhood of | | Number of houses obtaining water from | | | | | | | | Number and percentage of infected houses in which domestic animals are reported. | | | | | | | | Number of infected villages. |
|-----------------------------|-------|---------|--------|---------------|----------------|-----------------|-----------------|-----------------|----------------|--------------|------------|--|--------|------|------|---------|-------|-----------|-----------|--------|---------|-------|---------|---------|---------|---------|-----------|---------|--------|-------|------|--------|-------------|----------|---------|--------|-----------|---------|---|----------------|---------------|---------------|--------|----------------------------------|----------------|---------------------------------------|--------|---------|----------|------|--------------|---------------------------|------|--|--------|---------|-------|------|------|-----|-----|------------------------------|
| | Male. | Female. | Total. | 1 to 5 years. | 6 to 10 years. | 11 to 15 years. | 16 to 20 years. | 21 to 30 years. | Over 30 years. | Cultivation. | Fishermen. | Service, landholders, beggar, day-labourer, etc. | Jain. | Hin. | Gar. | Gurkha. | Rava. | Musalman. | Brahmins. | Ahoms. | Kolita. | Koch. | Nadial. | Lahung. | Barooh. | Kakani. | Rajbansi. | Chutia. | Patia. | Keot. | Sut. | Sheik. | Hindustani. | Kachari. | Ghansi. | Mikir. | Kalbarta. | Sonari. | | Heavy jungle. | Light jungle. | Open country. | Towns. | Tanks. | Running water. | Wells. | Tanks. | Rivers. | Ditches. | Bls. | Water-works. | Cattle (cows, buffaloes). | Dog. | Cat. | Fowls. | Pigeon. | Goat. | Hog. | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | | | |
| Nowgong, Eastern Circle ... | 122 | 40 | 162 | 36 | 39 | 30 | 21 | 18 | 18 | 144 | 18 | ... | ... | ... | ... | ... | ... | ... | 6 | 6 | 12 | 21 | 18 | 6 | ... | 6 | 18 | 9 | 3 | 9 | 3 | 24 | 6 | 5 | 5 | 3 | ... | ... | 60 | 15 | 115 | 21 | 11 | 45 | 87 | 54 | 45 | 63 | ... | ... | ... | 92 | 15 | 7 | 21 | 9 | 15 | 7 | ... | ... | | |
| Nowgong, Western Circle ... | 44 | 25 | 69 | 3 | 33 | 19 | 7 | 2 | 5 | 59 | 10 | ... | ... | ... | ... | ... | ... | 11 | 2 | ... | 2 | 12 | 10 | 11 | 1 | 6 | ... | 1 | 1 | 7 | 6 | ... | ... | ... | ... | ... | ... | 40 | ... | 31 | 26 | 12 | ... | 42 | 8 | ... | 43 | 17 | 1 | ... | 57 | 36 | 24 | 15 | 1 | 1 | ... | ... | ... | | | |
| Total Nowgong District ... | 166 | 65 | 231 | 39 | 72 | 49 | 28 | 20 | 23 | 203 | 28 | ... | ... | ... | ... | ... | ... | 11 | 8 | 6 | 14 | 36 | 28 | 17 | 1 | 11 | 18 | 10 | 3 | 16 | 9 | 24 | 6 | 5 | 5 | 3 | ... | ... | 100 | 15 | 146 | 47 | 23 | 45 | 129 | 62 | 45 | 106 | 17 | 1 | ... | 140 | 51 | 31 | 36 | 10 | 16 | 10 | ... | ... | | |
| Tezpur Subdivision ... | 44 | 10 | 54 | 6 | 13 | 7 | 13 | 15 | 1 | 49 | 8 | 7 | ... | ... | ... | ... | ... | 1 | 6 | 2 | 14 | 7 | 5 | ... | ... | 6 | 1 | ... | ... | 5 | 7 | ... | ... | ... | ... | ... | ... | 16 | 8 | 45 | ... | 1 | 2 | 18 | 31 | 3 | 15 | 2 | ... | ... | 45 | 15 | 21 | 5 | 1 | 9 | ... | ... | ... | | | |
| Mangaldai Subdivision ... | 95 | 47 | 142 | 11 | 30 | 26 | 16 | 20 | 19 | 131 | 7 | 4 | ... | 3 | ... | 1 | 33 | 2 | 2 | ... | 13 | 15 | 7 | ... | ... | ... | ... | 2 | ... | 8 | ... | ... | ... | 56 | ... | ... | ... | ... | 93 | 58 | 81 | 5 | 1 | 15 | 50 | 11 | 27 | 104 | ... | ... | ... | 136 | 110 | 109 | 146 | 51 | 42 | 84 | ... | ... | | |
| Gauhati Subdivision ... | 142 | 86 | 228 | 20 | 90 | 40 | 28 | 28 | 22 | 185 | 6 | 37 | ... | 10 | 19 | 1 | 25 | 17 | 3 | 2 | 31 | 25 | 6 | 1 | ... | 4 | 4 | 2 | ... | 1 | 4 | ... | ... | 40 | ... | 24 | 6 | 3 | ... | 120 | 36 | 98 | 81 | 10 | 9 | 28 | 89 | 82 | 59 | ... | ... | 7 | 144 | 63 | 86 | 110 | 31 | 43 | 52 | ... | 100 | |
| Barpeta Subdivision ... | 10 | 1 | 11 | ... | 1 | 1 | 2 | 5 | 2 | 10 | 1 | ... | 2 | ... | ... | ... | ... | ... | ... | ... | 2 | 4 | 1 | ... | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 6 | 1 | 8 | 2 | ... | ... | 5 | 6 | 3 | 2 | ... | ... | ... | 7 | 5 | 6 | 11 | 4 | ... | ... | ... | ... | | | |
| Goalpara Subdivision ... | 78 | 37 | 115 | 13 | 26 | 27 | 24 | 19 | 7 | 111 | 3 | 1 | ... | 10 | ... | 41 | 5 | ... | ... | 3 | ... | 3 | ... | ... | ... | ... | 3 | ... | ... | ... | ... | ... | ... | 50 | ... | ... | ... | ... | 56 | 7 | 108 | ... | ... | ... | 8 | 109 | 4 | ... | ... | 2 | ... | ... | 105 | 88 | 35 | 88 | 5 | 5 | 16 | ... | ... | |
| Dhubri Subdivision ... | 12 | 2 | 14 | 1 | 6 | 3 | ... | 4 | ... | 11 | ... | 3 | ... | ... | ... | ... | 7 | 1 | ... | ... | ... | ... | ... | ... | ... | ... | 5 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3 | ... | 3 | 10 | 1 | ... | 5 | 8 | ... | ... | 1 | ... | ... | 6 | 10 | 8 | 6 | ... | ... | ... | ... | ... | | | |
| Total ... | 547 | 218 | 765 | 89 | 238 | 153 | 139 | 111 | 74 | 683 | 50 | 52 | 2 | 13 | 29 | 2 | 30 | 43 | 20 | 10 | 77 | 87 | 60 | 18 | 1 | 23 | 21 | 14 | 3 | 6 | 21 | 4 | 6 | 5 | 5 | 27 | 7 | ... | ... | 5 | 489 | 145 | 38 | 11 | 243 | 310 | 164 | 271 | 19 | 4 | 7 | 562 | 340 | 206 | 405 | 102 | 120 | 142 | ... | ... | | |
| | 68.8 | 31.2 | ... | 11.2 | 20.9 | 10.2 | 16.3 | 13.9 | 9.3 | 57.2 | 6.2 | 6.5 | 2 | 1.6 | 3.6 | 2 | 1.4 | 1.4 | 2.5 | 1.2 | 9.7 | 1.9 | 2 | 2.2 | 1 | 2.3 | 1.8 | 1 | 3 | 1.7 | 1.5 | 3.0 | 7 | 1.9 | 6 | 3.2 | 1.8 | ... | ... | 5.7 | 5.7 | 61.5 | 18.3 | 4.5 | 8.9 | 30.5 | 40.1 | 20.6 | 27.1 | 2.3 | 5 | 8 | 74.4 | 42.7 | 37.2 | 51.0 | 12.8 | 15.0 | 17.8 | ... | ... | |

APPENDIX II.

DISTRICT RETURN.

Deaths from kala-azar by districts for 20 years in Assam.

| Districts. | 1893. | 1894. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| Cachar ... | 2 | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3 | ... | 22 | 5 | 6 | 2 | 3 | 2 | |
| Sylhet ... | 30 | 2 | 9 | 4 | ... | 3 | ... | 3 | 147 | 168 | 721 | 1,020 | 955 | 743 | 576 | 561 | 454 | 866 | 549 | 394 | 444 |
| Goalpara ... | 623 | 384 | 265 | 298 | 232 | 134 | 161 | 110 | 62 | 49 | 44 | 64 | 86 | 90 | 49 | 32 | 81 | 87 | 135 | 192 | 206 |
| Kamrup ... | 2,490 | 2,149 | 2,059 | 2,244 | 2,756 | 1,693 | 1,745 | 1,262 | 830 | 1,014 | 651 | 458 | 499 | 438 | 516 | 386 | 378 | 450 | 354 | 358 | 294 |
| Darrang ... | 1,620 | 1,992 | 2,477 | 2,471 | 3,597 | 4,113 | 4,101 | 279 | 2,446 | 3,391 | 2,657 | 1,611 | 1,106 | 898 | 845 | 649 | 643 | 627 | 679 | 563 | 399 |
| Nowgong ... | 5,407 | 8,585 | 11,037 | 10,583 | 12,012 | 10,515 | 8,192 | 4,661 | 2,346 | 1,697 | 960 | 595 | 379 | 215 | 208 | 146 | 140 | 221 | 286 | 308 | 417 |
| Sibsagar ... | 1 | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 6 | 11 | 2 | 1 | ... | 34 | 31 | 29 |
| Lakhimpur ... | 50 | 36 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 | 17 | ... | 5 | ... | 50 | 11 | ... | 1 |
| Garo Hills ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 15 | 7 | 11 | 15 | 23 | 15 | 16 | 15 |
| Khasi and Jaintia Hills. | 24 | 13 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 |
| Total ... | 10,247 | 13,164 | 15,847 | 15,605 | 18,597 | 16,458 | 14,199 | 9,015 | 5,831 | 6,319 | 5,033 | 3,748 | 3,020 | 2,422 | 2,234 | 1,797 | 1,718 | 2,326 | 2,066 | 1,891 | 1,814 |

Deaths from kala-azar in the district of Cachar.

| Circle. | 1893. | 1894. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| <i>Urban.</i> | | | | | | | | | | | | | | | | | | | | | |
| Silchar ... | ... | ... | ... | | | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... |
| Hailakandi ... | ... | ... | ... | | | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... |
| <i>Rural.</i> | | | | | | | | | | | | | | | | | | | | | |
| Silchar ... | ... | ... | ... | | | | | | | | | | | | ... | ... | 1 | 2 | ... | ... | ... |
| Lakhipur ... | 2 | ... | ... | | | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... |
| Katigora ... | ... | ... | ... | | | | | | | | | | | | ... | 3 | ... | ... | ... | ... | ... |
| Hailakandi ... | ... | ... | ... | | | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... |
| Tea Estates ... | ... | ... | 1 | | | | | | | | | | | | ... | 2 | 5 | ... | 3 | 2 | 3 |
| Railways ... | ... | ... | ... | | | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... |
| Total ... | 2 | 1 | | | | | | | | | | | | | ... | 5 | 6 | 2 | 3 | 2 | 8 |

Deaths from kala-azar in the district of Sylhet.

| Circle. | 1893. | 1894. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| <i>Urban.</i> | | | | | | | | | | | | | | | | | | | | | |
| 1. Sylhet town ... | ... | ... | ... | | | | | | | | | | | 7 | 9 | 3 | 2 | 3 | ... | ... | ... |
| 2. Maulvi Bazar town ... | ... | ... | ... | | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| 3. Karimganj „ | ... | ... | ... | | | | | | | | | | | ... | ... | 8 | 1 | ... | ... | 1 | 3 |
| 4. Habiganj „ | ... | ... | ... | | | | | | | | | | | ... | 1 | ... | 1 | 1 | ... | 1 | ... |
| 5. Sunamganj „ | ... | ... | ... | | | | | | | | | | | 9 | 9 | 2 | ... | ... | ... | 7 | 8 |
| <i>Rural.</i> | | | | | | | | | | | | | | | | | | | | | |
| 6. Sylhet thana ... | 1 | ... | ... | | | | | | | | | | | 94 | 91 | 77 | 53 | 127 | 122 | 39 | 59 |
| 7. Balaganj „ | 29 | 2 | ... | | | | | | | | | | | 137 | 101 | 96 | 95 | 119 | 68 | 45 | 76 |
| 8. Kanairghat „ | ... | ... | ... | | | | | | | | | | | 1 | 1 | 4 | 9 | 56 | 18 | 4 | 13 |
| 9. Maulvi Bazar thana | ... | ... | ... | | | | | | | | | | | 109 | 81 | 96 | 63 | 89 | 74 | 24 | 6 |
| 10. Kulaura „ | ... | ... | ... | | | | | | | | | | | 5 | 4 | ... | ... | 30 | ... | ... | 2 |
| 11. Karimganj „ | ... | ... | ... | | | | | | | | | | | 35 | 24 | 51 | 8 | ... | 15 | ... | 28 |
| 12. Jaldhup „ | ... | ... | ... | | | | | | | | | | | 62 | 33 | 31 | 26 | 43 | 27 | 64 | 56 |
| 13. Sunamganj „ | ... | ... | ... | | | | | | | | | | | 63 | 54 | 22 | 10 | 20 | 5 | 39 | 65 |
| 14. Deral „ | ... | ... | ... | | | | | | | | | | | 42 | 39 | 52 | 9 | ... | 16 | 11 | 13 |
| 15. Chhatak „ | ... | ... | ... | | | | | | | | | | | 175 | 97 | 83 | 146 | 268 | 103 | 51 | 66 |
| 16. Dharmapassa „ | ... | ... | ... | | | | | | | | | | | ... | ... | ... | 9 | 14 | 19 | 5 | 1 |
| 17. Habiganj „ | ... | ... | ... | | | | | | | | | | | ... | 23 | 17 | 18 | 21 | 3 | 8 | 15 |
| 18. Baniachang „ | ... | ... | ... | | | | | | | | | | | 1 | ... | 5 | 5 | 16 | 5 | 1 | ... |
| 19. Nabiganj „ | ... | ... | ... | | | | | | | | | | | ... | ... | 1 | 4 | 6 | 39 | 59 | 13 |
| 20. Madhabpur „ | ... | ... | ... | | | | | | | | | | | ... | ... | 4 | ... | 40 | 16 | 31 | ... |
| Tea Estates ... | ... | ... | ... | 9 | | | | | | | | | | 4 | 9 | 9 | ... | 13 | 15 | 4 | 21 |
| Railways ... | ... | ... | ... | | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| Total ... | 30 | 2 | 9 | | | | | | | | | | | 743 | 579 | 561 | 454 | 866 | 549 | 394 | 444 |

APPENDIX II—continued.
Deaths from kala-azar in the district of Goalpara.

| Circle. | 1893. | 1894. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| <i>Urban.</i> | | | | | | | | | | | | | | | | | | | | | |
| 1. Dhubri town ... | 6 | 2 | 3 | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| 2. Goalpara „ ... | 21 | 11 | 7 | ... | | | | | | | | | | 17 | 7 | 11 | 8 | 12 | 9 | 9 | 4 |
| <i>Rural.</i> | | | | | | | | | | | | | | | | | | | | | |
| 3. Dhubri thana ... | 48 | 40 | 45 | 21 | | | | | | | | | | 4 | ... | ... | ... | 1 | ... | ... | ... |
| 4. Agomoni „ ... | ... | ... | 23 | ... | | | | | | | | | | ... | ... | 3 | ... | 4 | ... | ... | ... |
| 5. South Salmara ... | 209 | 85 | 28 | ... | | | | | | | | | | ... | ... | ... | 1 | 1 | 1 | 4 | 1 |
| 6. Bilasipara thana... | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | 5 | ... | ... | ... | 1 |
| 7. Goalpara „ ... | 332 | 245 | 155 | 204 | | | | | | | | | | 20 | 9 | 10 | 23 | 7 | 9 | 20 | 19 |
| 8. Lakhimpur „ ... | ... | ... | 1 | ... | | | | | | | | | | 4 | 3 | 1 | 3 | 5 | 6 | 6 | 3 |
| 9. North Salmara thana. | ... | ... | ... | ... | | | | | | | | | | 8 | ... | 1 | 2 | 1 | ... | 1 | ... |
| 10. Dudnai thana ... | 7 | 1 | 3 | ... | | | | | | | | | | 26 | 7 | ... | 35 | 55 | 103 | 151 | 173 |
| 11. Bijni Duar „ ... | ... | ... | ... | ... | | | | | | | | | | 4 | 2 | ... | ... | ... | ... | ... | ... |
| 12. 1st and 2nd Circles, Sidli. | ... | ... | ... | ... | | | | | | | | | | 4 | ... | ... | ... | 1 | ... | ... | ... |
| 13. 3rd Circle, Sidli ... | ... | ... | ... | ... | | | | | | | | | | 2 | 21 | 6 | ... | ... | 1 | ... | ... |
| 14. 4th and 5th Circles Sidli. | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | 1 | ... |
| 15. Guma ... | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| 16. Ripu ... | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| 17. Chirang ... | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| 18. Forest villages ... | ... | ... | ... | ... | | | | | | | | | | 1 | ... | ... | 4 | ... | ... | ... | ... |
| Tea Estates ... | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | 1 | ... | ... |
| Railways ... | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| Total ... | 623 | 334 | 263 | 223 | | | | | | | | | | 90 | 49 | 32 | 81 | 87 | 135 | 192 | 206 |

Deaths from kala-azar in the district of Kamrup.

| Circle. | 1893. | 1894. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| <i>Urban.</i> | | | | | | | | | | | | | | | | | | | | | |
| 1. Gauhati town ... | 261 | 146 | 107 | ... | | | | | | | | | | 53 | 43 | 31 | 10 | 20 | 12 | 13 | 21 |
| 2. Barpeta „ ... | 172 | 132 | 88 | ... | | | | | | | | | | 2 | 1 | 11 | 3 | 5 | 4 | 4 | 1 |
| <i>Rural.</i> | | | | | | | | | | | | | | | | | | | | | |
| 3. Gauhati mauza ... | 433 | 255 | 197 | 470 | | | | | | | | | | 96 | 97 | 72 | 132 | 119 | 53 | 110 | 67 |
| 4. Palasbari „ ... | 1,041 | 812 | 776 | 623 | | | | | | | | | | 141 | 107 | 54 | 70 | 116 | 100 | 75 | 103 |
| 5. Nalbari „ ... | 163 | 382 | 393 | 399 | | | | | | | | | | 43 | 58 | 33 | 30 | 39 | 7 | 53 | 27 |
| 6. Rangia „ ... | ... | ... | 11 | 85 | | | | | | | | | | 75 | 182 | 159 | 116 | 140 | 164 | 98 | 63 |
| 7. Barpeta, including Roha and Barjali. | 367 | 348 | 440 | 538 | | | | | | | | | | 27 | 26 | 22 | 13 | 9 | 14 | 33 | 11 |
| Tea Estates ... | 48 | 63 | 47 | ... | | | | | | | | | | 1 | 2 | 4 | 4 | 2 | ... | ... | 1 |
| Railways ... | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| Total ... | 2,490 | 2,149 | 2,059 | 2,115 | | | | | | | | | | 438 | 516 | 386 | 373 | 450 | 354 | 385 | 294 |

Deaths from kala-azar in the district of Darrang.

| Circle. | 1893. | 1894. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| <i>Urban.</i> | | | | | | | | | | | | | | | | | | | | | |
| 1. Tezpur town ... | 2 | 4 | 5 | 7 | | | | | | | | | | 3 | 4 | ... | ... | 3 | 1 | 1 | 1 |
| 2. Mangaldai town... | 15 | 11 | 13 | 13 | | | | | | | | | | 4 | 4 | ... | 1 | 2 | ... | 2 | ... |
| <i>Rural.</i> | | | | | | | | | | | | | | | | | | | | | |
| 3. Tezpur mauza ... | ... | 1 | 13 | 60 | | | | | | | | | | 81 | 81 | 66 | 64 | 30 | 37 | 53 | 39 |
| 4. Sootia „ ... | 1 | 3 | ... | 55 | | | | | | | | | | 10 | 21 | 8 | 12 | 3 | 2 | 12 | 18 |
| 5. Gohpur „ ... | ... | ... | ... | ... | | | | | | | | | | ... | ... | 1 | ... | 1 | 1 | 23 | 4 |
| 6. Behali „ ... | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| 7. Mangaldai ... | 1,587 | 1,924 | 2,405 | 2,145 | | | | | | | | | | 50 | 53 | 31 | 48 | 40 | 69 | 45 | 70 |
| 8. Kalaigson ... | 12 | 5 | 28 | 107 | | | | | | | | | | 265 | 156 | 117 | 141 | 93 | 88 | 72 | 51 |
| 9. Panery ... | ... | ... | ... | ... | | | | | | | | | | 342 | 373 | 384 | 329 | 420 | 457 | 321 | 165 |
| 10. Kariapara ... | ... | ... | 4 | 4 | | | | | | | | | | 100 | 120 | 37 | 40 | 18 | 19 | 21 | 18 |
| Tea Estates ... | 3 | 33 | 9 | ... | | | | | | | | | | 43 | 33 | 5 | 8 | 17 | 5 | 13 | 8 |
| Railways ... | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| Chetgari ... | ... | 11 | ... | 67 | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| Total ... | 1,620 | 1,992 | 2,477 | 2,496 | | | | | | | | | | 898 | 845 | 649 | 643 | 627 | 679 | 563 | 399 |

APPENDIX II—continued.

Deaths from kala-azar in the district of Nowgong.

| Circle. | 1893. | 1894. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|----------------------|-------|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| <i>Urban.</i> | | | | | | | | | | | | | | | | | | | | | |
| 1. Nowgong town ... | 194 | 205 | 160 | 91 | | | | | | | | | | 17 | 9 | 13 | 11 | 12 | 17 | 21 | 48 |
| <i>Rural.</i> | | | | | | | | | | | | | | | | | | | | | |
| 2. Nowgong mauza ... | 2,958 | 4,534 | 5,539 | 5,206 | | | | | | | | | | 65 | 49 | 38 | 31 | 44 | 82 | 94 | 196 |
| 3. Roha „ ... | 1,315 | 2,355 | 3,133 | 3,243 | | | | | | | | | | 61 | 85 | 58 | 30 | 40 | 51 | 68 | 64 |
| 4. Shamaguri „ ... | 930 | 316 | 1,937 | 1,802 | | | | | | | | | | 43 | 37 | 34 | 56 | 97 | 99 | 92 | 81 |
| 5. Lunding „ ... | ... | ... | ... | ... | | | | | | | | | | 6 | 12 | ... | 5 | 2 | ... | ... | 3 |
| Tea Estates ... | 20 | 165 | 277 | 246 | | | | | | | | | | 23 | 16 | 3 | 7 | 20 | 37 | 27 | 29 |
| Railways ... | ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | 6 | 1 |
| Total ... | 5,407 | 8,585 | 11,037 | 10,588 | | | | | | | | | | 215 | 208 | 146 | 110 | 221 | 286 | 308 | 417 |

Deaths from kala-azar in the district of Sibsagar.

| Circle. | 1893. | 1894. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| <i>Urban.</i> | | | | | | | | | | | | | | | | | | | | | |
| 1. Sibsagar town ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 2. Jorhat „ ... | ... | 1 | 1 | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 3. Golaghat „ ... | 1 | 1 | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| <i>Rural.</i> | | | | | | | | | | | | | | | | | | | | | |
| 4. Sibsagar mauza ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | 1 | ... | ... | ... | ... | ... |
| 5. Bontola „ ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 6. Sonari „ ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 7. Jorhat „ ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | 1 | ... | ... | ... | ... | ... |
| 8. Golaghat „ ... | ... | ... | ... | | | | | | | | | | ... | 1 | 10 | ... | 1 | ... | 32 | 29 | 27 |
| Tea Estates ... | ... | ... | 4 | | | | | | | | | | ... | 5 | 1 | ... | ... | ... | 2 | 2 | 2 |
| Railways ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Total ... | 1 | 2 | 5 | | | | | | | | | | ... | 6 | 11 | 2 | 1 | ... | 34 | 31 | 29 |

Deaths from kala-azar in the district of Lakhimpur.

| Circle. | 1893. | 1894. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| <i>Urban.</i> | | | | | | | | | | | | | | | | | | | | | |
| 1. Dibrugarh town... | 1 | ... | ... | | | | | | | | | | ... | 1 | ... | ... | ... | ... | ... | ... | ... |
| 2. North Lakhimpur town. | 1 | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| <i>Rural.</i> | | | | | | | | | | | | | | | | | | | | | |
| 3. Dibrugarh mauza ... | ... | ... | ... | | | | | | | | | | ... | 2 | ... | 1 | ... | ... | ... | ... | ... |
| 4. North Lakhimpur mauza. | ... | ... | ... | | | | | | | | | | ... | 5 | ... | ... | ... | 1 | ... | ... | ... |
| 5. Danduma mauza... | ... | 2 | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Tea Estates ... | 48 | 34 | 30 | | | | | | | | | | ... | 9 | ... | 4 | ... | 49 | 11 | ... | ... |
| Railways ... | ... | ... | ... | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... | 1 |
| Total ... | 50 | 36 | 30 | | | | | | | | | | ... | 17 | ... | 5 | ... | 50 | 11 | ... | 1 |

APPENDIX II—concluded.

Deaths from kala-azar in the districts of Garo Hills.

| Circle. | 1893. | 1894. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907. | 1908. | 1909. | 1910. | 1911. | 1912. | 1913. |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| <i>Urban.</i> | | | | | | | | | | | | | | | | | | | | | |
| 1. Tura town ... | | | | | | | | | | | | | | ... | 1 | ... | ... | ... | 1 | ... | ... |
| <i>Rural.</i> | | | | | | | | | | | | | | | | | | | | | |
| 2. Nibari mauza ... | | | | | | | | | | | | | | 7 | ... | 5 | 14 | 18 | 9 | 11 | 12 |
| 3. Fulbari „ ... | | | | | | | | | | | | | | ... | 1 | ... | ... | ... | 3 | 1 | 1 |
| 4. Rangapani „ ... | | | | | | | | | | | | | | 2 | ... | ... | 1 | 1 | ... | ... | 1 |
| 5. Mahendr a g a n j mauza. | | | | | | | | | | | | | | 6 | 5 | 6 | ... | 4 | 2 | 4 | 1 |
| Tea Estates ... | | | | | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| Railways ... | | | | | | | | | | | | | | ... | ... | ... | ... | ... | ... | ... | ... |
| Total ... | | | | | | | | | | | | | | 15 | 7 | 11 | 15 | 23 | 15 | 16 | 15 |

APPENDIX III.

List of places in which Leishmania found by splenic puncture.

| District. | Serial No. | Names of villages. |
|--------------|------------|---|
| 1 | 2 | 3 |
| Kamrup ... | ... | Gorpara. Mailhatta. Uhubaria. |
| Nowgong ... | ... | Bhagza. |
| Darrang ... | ... | Samatrapara. |
| (Mangaldai.) | ... | Borarakhat. Kotahi. Upurkurua. |
| Goalpara ... | ... | Nishangram. Halgiripara. Garopara. Chalantapara. |

APPENDIX IV.

List of villages found infected and the cases found in them.

| District. | Serial No. | Names of villages. | No. of cases found. |
|------------------------------|------------|--------------------------|---------------------|
| 1 | 2 | 3 | 4 |
| Nowgong (Western Circle.) | 1 | Municipal ward I ... | 6 |
| | 2 | " " IV ... | 6 |
| | 3 | Teliagaon ... | 2 |
| | 5 | Pahukatagaon ... | 6 |
| | ... | Dudargaon Chechamukh ... | 2 |
| | 32 | Khutikatia ... | 2 |
| | 31 | Senchoya ... | 3 |
| | 28 | Elengi Satra ... | 4 |
| | 30 | Kumargaon ... | 1 |
| | 25 | Birah Bebejia ... | 1 |
| | 35 | Toklai Bebejia ... | 2 |
| | 54 | Pachim Salmara ... | 1 |
| | 55 | Pub Salmara ... | 2 |
| | 56 | Kujarbari ... | 1 |
| | 50 | Nij Jagial ... | 1 |
| | 51 | Petborah ... | 2 |
| | 39 | Baligaon ... | 2 |
| | 80 | Chamohora ... | 1 |
| | 122 | Boronha ... | 3 |
| | 139 | Dhing ... | 1 |
| | ... | Majgaon ... | 1 |
| | 316 | Digaldari ... | 2 |
| | 315 | Daobali ... | 3 |
| | 301 | Barpujia ... | 1 |
| | 357 | Bagora ... | 1 |
| | 374 | Tetalia ... | 1 |
| | 381 | Bhakatgaon ... | 1 |
| | 310 | Hariamukh ... | 1 |
| | 41 | Pohukarikhaiti ... | 1 |
| | 486 | Tegheriagaon ... | 2 |
| | 542 | Killinggaon ... | 3 |

APPENDIX IV—continued.

List of villages found infected—continued.

| District. | Serial No. | Names of villages. | No. of cases found. |
|---|------------|-----------------------------------|---------------------|
| 1 | 2 | 3 | 4 |
| Nowgong—con'd. ... (Western Circle— concl'd.) | 498 | Bhogjopgaon ... | 1 |
| | 496 | Paschim Nowgong ... | 2 |
| | 484 | Nowholagaon ... | 3 |
| | 540 | Barpaik ... | 1 |
| | 532 | Dhoramtul, No. II ... | 1 |
| | 574 | Niz Jorabari ... | 1 |
| Eastern Circle ... | 3 & 1 | Nowgong town, wards Nos. II & III | 10 |
| | 10 | Chota Haiber ... | 5 |
| | 5 | Maj Pathari ... | 2 |
| | 6 | Nam „ ... | 1 |
| | 3 | Bhotaigaon ... | 1 |
| | 13 | Dimaruguri ... | 2 |
| | 38 | Morengial ... | 1 |
| | 44 | Barpathari ... | 1 |
| | 70 | Puranigudam ... | 1 |
| | 90 | Sutargaon ... | 1 |
| | 88 | Rupahi Bhakatgaon ... | 1 Free. |
| | 260 | Jaklabandha ... | 2 |
| | 308 | Deorisilabandha ... | 3 |
| | 311 | Madhatari ... | 1 |
| | 293 | Lungichuk ... | 3 |
| | 264 | Chutialgaon ... | 1 |
| | 313 | Silgaat ... | 1 |
| | 290 | Kuaritola ... | 3 |
| | ... | Amguri ... | 2 |
| | 43 | Deodhorgaon ... | 1 |
| | 332 | Barkondali ... | 3 |
| | 335 | Nogomthagaon ... | 5 |
| | 336 | Nagosain Khat ... | 2 |
| | 337 | Kamargaon ... | 4 |
| | 25 | Katanigaon ... | 1 |
| | 343 | Dyangia ... | 11 |
| | 349 | Chengmora ... | 5 |
| | 352 | Tabuki grant ... | 5 |
| | 359 | Kacharigaon, No. I ... | 4 |
| | 360 | „ No. II ... | 3 |
| | 362 | Sagunbahi ... | 6 |
| | 364 | Jamurmur ... | 4 |
| | 367 | Pachim Kathiatoli ... | 1 Free. |
| | 369 | Nambor Lalungaon ... | 3 |
| | 371 | Sarupathar ... | 3 |
| | 377 | Bhelewuri ... | 4 |
| | 392 | Tetelisora ... | 2 |
| | 394 | Derrangi ... | 1 |
| | 395 | Niz Kampur ... | 1 Free. |
| | 397 | Ghelani ... | 5 |
| | 398 | Deb Narikoli ... | 2 Free. |
| | 400 | Chorai Hazi ... | 2 |
| | 402 | Borpothiagaon ... | 2 |
| | 403 | Bhotbhotia ... | 7 |
| | 410 | Baliramgaon ... | 6 |
| | 414 | Kutkatia Kakatgaon ... | 4 Free. |

APPENDIX IV—continued.
List of villages found infected—continued.

| District. | Serial No. | Names of villages. | | | No. of cases found. |
|---|------------|------------------------|-----|-----|---|
| 1 | 2 | 3 | | | 4 |
| Nowgong—concl'd. ... (Eastern Circle—concl'd.) | 412 | Nagaonpam | ... | ... | 2 |
| | 466 | Jugijan | ... | ... | 4 |
| | 465 | Bhedew | ... | ... | 4 |
| | 469 | Niz Doboka | ... | ... | 1 |
| | 460 | Nam „ | ... | ... | 2 |
| | 304 | Borbhokati | ... | ... | 1 |
| | 4 | Bengena Ati | ... | ... | 1 |
| | 5 | Hilekhowa | ... | ... | 3 |
| | 63 | Na Bebejia | ... | ... | 1 |
| | | Mowkhati | ... | ... | 2 |
| | | Jujorigaon | ... | ... | 5 |
| | 304 | Dulalmadhav | ... | ... | 6 |
| | 15 | Nortamgaon | ... | ... | 20 (Found infected by Major Mackie, I.M.S.) |
| | 427 | Lanka ... | ... | ... | 1 |
| | 425 | Namkharikhana | ... | ... | 1 |
| Darrang... (Tezpur subdivision.) | 426 | Aliehya ... | ... | ... | 1 |
| | 514 | Halikhatijan | ... | ... | 2 |
| | 511, 152 | Lumding | ... | ... | 5 |
| | 29 | Ward No. III | ... | ... | 1 |
| | 4 | Parbatia | ... | ... | 2 |
| | 19 | Kalibari... | ... | ... | 1 |
| | 25 | Kataki Chuburi | ... | ... | 1 |
| | 24 | Dawgaonpukri | ... | ... | 3 |
| | 28 | Sapat Chuburi | ... | ... | 5 |
| | 147 | Borati ... | ... | ... | 1 |
| | 215 | Bamingabari | ... | ... | 1 |
| | 228 | Atitola ... | ... | ... | 4 |
| | 301 | Nokhonia Pathar | ... | ... | 1 |
| | 334 | Bagijuly | ... | ... | 2 |
| | 335 | Batiamari | ... | ... | 2 |
| | 387 | Garuabari | ... | ... | 3 |
| | 422 | Gahigoriagaon | ... | ... | 3 |
| | 495 | Marmkuri | ... | ... | 1 |
| | 524 | Gatonga Karhadal | ... | ... | 1 |
| | 544 | Khanoparbataburi | ... | ... | 1 |
| | 528 | Madhubi Saikia Chuburi | ... | ... | 4 |
| | 5 4 | Bindukuri | ... | ... | 2 |
| Darrang... (Mangaldai subdivision.) | 1 | Mangaldai Town | ... | ... | 1 |
| | 3 | Tengabari | ... | ... | 2 |
| | 12 | Dewnagaon | ... | ... | 1 |
| | 5 | Gadhiapara | ... | ... | 1 |
| | 20 | Niz Magalbasa | ... | ... | 3 |
| | 37 | „ Kalaigaon | ... | ... | 1 |
| | 76 | Goriapara | ... | ... | 1 |
| | 118 | Niz R ngamati | ... | ... | 2 |
| | 123 | Hazerika Chuburi | ... | ... | 2 |
| | 124 | Pithakhoa | ... | ... | 1 |
| | 128 | Setmadar | ... | ... | 1 |
| | 126 | Devananda Satra | ... | ... | 1 |
| | 135 | Satghoria | ... | ... | 1 |
| | 139 | Maraigaon | ... | ... | 1 |
| | 153 | Kholaig on | ... | ... | 1 |
| | 156 | Ujar Kurua | ... | ... | 10 |
| | 190 | Bej libari | ... | ... | 1 |
| | 191 | Metapara | ... | ... | 1 |
| | 206 | Borkolajhar | ... | ... | 1 |
| | 205 | Patharughat | ... | ... | 1 |
| | 211 | Battabari | ... | ... | 2 |
| | 212 | Chengapara | ... | ... | 1 |
| | 214 | Chengapara | ... | ... | 1 |

APPENDIX IV—continued.
List of villages found infected—continued.

| District. | Serial No. | Names of villages. | No. of cases found. |
|--|------------|--------------------|---------------------|
| 1 | 2 | 3 | 4 |
| Darrang—concl'd. ... (Mangaldai subdivision —concl'd.) | 222 | Khatarā | 2 |
| | 246 | Kamārgaon | 1 |
| | 255 | Borigaon | 1 |
| | 254 | Katehi ... | 1 |
| | 255 | Nagaon... | 1 |
| | 256 | Chamotiapara | 4 |
| | 259 | Kharkho para | 1 |
| | 278 | Bororakhat | 6 |
| | 285 | Chenialpara | 1 |
| | 287 | Bagoribari | 1 |
| | 286 | Deoriapara | 1 |
| | 288 | Suk iapara | 1 |
| | 289 | Jalukbari | 1 |
| | 293 | Kohorukuchi | 3 |
| | 296 | Rampur... | 1 |
| | 306 | Kaljuri ... | 1 |
| | 307 | Balisitha | 4 |
| | 310 | Chabemoholiapara | 2 |
| | 308 | Rangajulikhat | 1 |
| | 335 | Rupukhat | 2 |
| | 337 | Chata para | 3 |
| | 338 | Mohoteapara | 1 |
| | 365 | Dongpara | 1 |
| | 382 | Kakalbhangī | 6 |
| | 384 | Nagarasara | 8 |
| | 413 | Kasia ... | 1 |
| | 414 | Niz Harisinga | 1 |
| | 417 | ,, Jajarabari | 2 |
| | 423 | Ghagrāpara | 6 |
| | 434 | Gorakakh | 5 |
| | 454 | Pub Nabari | 1 |
| | 468 | Kachar tol | 1 |
| | 469 | Makhkanda | 7 |
| | 473 | Hapubari | 6 |
| | 477 | Tamuragaon | 2 |
| | 478 | Niz Dola | 1 |
| | 489 | Pakhimuri | 1 |
| | 525 | Jurabari... | 4 |
| | 529 | Sangalbari | 5 |
| | 542 | Jhakarabari | 2 |
| | 531 | Bali para | 1 |
| | 544 | Borigaon | 6 |
| | 700 | Majgaon | 1 |
| | 707 | Bhakatpara | 2 |
| | | Thana Goalpara. | |
| Goalpara... ... (Goalpara subdivision). | 168 | Dalgoma | 1 |
| | 169 | Kasamtala | 1 |
| | 146 | Marnai ... | 5 |
| | 140 | Dubapara | 2 |
| | 179 | Sharapara | 2 |
| | 176 | Matia ... | 3 |
| | | Thana Dudnai. | |
| | 142 | Lakmakundi | 1 |
| | 14048 | Nishangram | 8 |
| | 79 | Shidli ... | 1 |
| | 52 | Sardapara | 3 |
| | 61 | Khamar Manikpur | 1 |
| | 145 | Thekashu | 10 |
| | 40-136 | Halgiripara | 8 |
| | 38 | Rowmari | 6 |
| | 39 | Digli ... | 7 |
| | 146-55 | Balasara | 5 |
| | 94 | B rgaon | 1 |
| | 36 | Shialmari | 5 |
| | 28 | Bangalpara | 1 |
| | 35 | Mandalgram | 4 |

APPENDIX IV—continued.

List of villages found infected—continued.

| District. | Serial No. | Names of villages. | No. of cases found. |
|--|------------|--------------------------------|---------------------|
| 1 | 2 | 3 | 4 |
| Goalpara—concl'd. ... (Goalpara subdivision—concl'd.) | | <i>Thana Dudnai—concl'd.</i> | |
| | | Upartalla | 12 |
| | 174 | Duramari | 3 |
| | 172 | Delguri | 2 |
| | 28 | Lalpara | 3 |
| | 31 | Pannapur | 1 |
| | ... | Mowamari | 1 |
| | 96 | Salpara | 8 |
| | 160 | Manopara | 2 |
| | 30 | Puranivita | 1 |
| | ... | Majengpara | 2 |
| | 147 | Bhodayapara | 3 |
| | | <i>Thana Lakhipur.</i> | |
| | 268 | Da araka | 2 |
| Dhubri subdivision ... | 1 | Ward No. I | 1 |
| | 30 | Barundanga (Pratabganj) | 1 |
| | 69 | Biskha | 1 |
| | 77 | Kidor | 1 |
| | 68 | Kanduri | 2 |
| | 82 | Nalia | 1 |
| | 117 | Mahamayarchar | 1 |
| | 123 | Sebaturi | 1 |
| | 289 | Pataodhon | 2 |
| | 290 | Verakhoa | 1 |
| | 296 | Kalasbhangra | 1 |
| | 533 | Thetari para | 1 |
| | | <i>Thana North Salmara.</i> | |
| | 798 | Kharobhuja | 1 |
| | 792 | Chalantapara | 2 |
| | 862 | Kheragaon | 1 |
| | 865 | Kerkhabari | 1 |
| | 854 | Rewmari | 1 |
| | | <i>Thana Bilasipara.</i> | |
| | 854 | Bandhabpara | 1 |
| Kamrup ... (Gauhati subdivision.) | ... | Ward No. I, Uzan bazar | 14 |
| | ... | Ulusarani | 1 |
| | ... | Uluari | 6 |
| | 5 & 6 | Saramia | 3 |
| | 6 | Silpukri | 3 |
| | 7 | Pinibinpara | 2 |
| | 9 | Bamun Maidan | 3 |
| | 16 | Nunmati | 1 |
| | ... | Barmutaria | 1 |
| | ... | Bongaon | 4 |
| | ... | Kherguli | 2 |
| | 8 | Maidam | 5 |
| | 21 | Kalitakoch | 2 |
| | 31 | Fatasil | 3 |
| | 32 | Matghoria | 4 |
| | 33 | Saokuchi | 3 |
| | 43 | Dakbingaon | 1 |
| | 44 | Uoulbakara | 1 |
| | 45 | Haluna | 5 |
| | 47 | Bhaghora | 6 |
| | 51 | Dharan | 1 |
| | 54 | Khalaihari | 5 |
| | 55 | Bangpur | 2 |
| | 66 | Tapatuli | 6 |
| | 67 | Kahikuchi | 2 |
| | 69 | Hapura... .. | 1 |
| | 71 | Raon | 1 |

APPENDIX IV—continued.

List of villages fund infected—continued.

| District. | Serial No. | Names of villages. | | | No. of cases found. |
|--|------------|--------------------|-----|-----|---------------------|
| 1 | 2 | 3 | | | 4 |
| Kumrup— <i>contd.</i> ... (Gauhati subdivision— <i>contd.</i>) | 72 | Haragaon | ... | ... | 1 |
| | 74 | Tataliguri | ... | ... | 1 |
| | 98 | Kachia ... | ... | ... | 6 |
| | 116 | Jutikuchi | ... | ... | 2 |
| | 117 | Grinod Bagisha | ... | ... | 1 |
| | 121 | Satilapur | ... | ... | 8 |
| | 144 | Hudumpur | ... | ... | 8 |
| | 122 | Kaotpara | ... | ... | 1 |
| | 134 | Malihata | ... | ... | 5 |
| | 135 | Lachana | ... | ... | 1 |
| | ... | Malehata | ... | ... | 1 |
| | 150 | Kallapara | ... | ... | 2 |
| | 144 | Parakuchi | ... | ... | 8 |
| | ... | Sarapara | ... | ... | 8 |
| | ... | Uparhali | ... | ... | 2 |
| | 138 | Sarapara | ... | ... | 4 |
| | 146 | Rangamati | ... | ... | 1 |
| | ... | Up rha'i | ... | ... | 1 |
| | 151 | Dhikuapara | ... | ... | 4 |
| | 152 | Jharapara | ... | ... | 1 |
| | 153 | Bippiari ... | ... | ... | 1 |
| | 162 | Mugakhal | ... | ... | 1 |
| | 164 | Bhaguabari | ... | ... | 1 |
| | 170 | Manman | ... | ... | 1 |
| | 184 | Dhupguri | ... | ... | 1 |
| | 239 | Langkhona | ... | ... | 1 |
| | ... | Manman | ... | ... | 1 |
| | 213 | Kochpara | ... | ... | 1 |
| | 212 | Galihaka | ... | ... | 1 |
| | 248 | Nizbagai | ... | ... | 4 |
| | 258 | Satubari | ... | ... | 1 |
| | ... | Bharkibhita | ... | ... | 1 |
| | 294 | Nagarbera | ... | ... | 17 |
| | 299 | Malacha | ... | ... | 1 |
| | 293 | Dukuchi | ... | ... | 8 |
| <i>North Kamrup.</i> | | | | | |
| ... | ... | Pia' khota | ... | ... | 1 } Free. |
| ... | ... | Di kar ... | ... | ... | 1 } |
| ... | ... | Dekar Kuchi | ... | ... | 1 } |
| ... | ... | Sunlarisal | ... | ... | 2 |
| ... | ... | Ghopla ... | ... | ... | 1 |
| ... | ... | Singra ... | ... | ... | 1 |
| ... | ... | Majgaon | ... | ... | 1 |
| ... | ... | Avoypur | ... | ... | 1 |
| ... | ... | Rangmahal | ... | ... | 2 |
| ... | ... | Bar Sandra | ... | ... | 2 |
| ... | ... | Sila Mahikhata | ... | ... | 1 |
| ... | ... | Rajadori | ... | ... | 2 |
| ... | ... | Sila ... | ... | ... | 1 |
| ... | ... | Balaibil ... | ... | ... | 3 |
| ... | ... | Baignon | ... | ... | 1 |
| ... | ... | Deoduar | ... | ... | 2 |
| ... | 275 | Dhakonia | ... | ... | 1 |
| ... | 259 | Murmela | ... | ... | 1 |
| ... | 287 | Batuchera | ... | ... | 6 |
| ... | ... | Kalakuchi | ... | ... | 8 |
| ... | 524 | Murara ... | ... | ... | 1 |
| ... | 505 | Kanikuchi | ... | ... | 1 |
| ... | 503 | Borokhil | ... | ... | 1 |
| ... | 401 | Baghmara | ... | ... | 8 |
| ... | 388 | Akana ... | ... | ... | 1 |

APPENDIX IV—continued.

List of villages found infected—continued.

| District. | Serial No. | Names of villages. | No. of cases found. |
|---|------------|------------------------------|---------------------|
| 1 | 2 | 3 | 4 |
| | | <i>North Kamrup—concl'd.</i> | |
| Kamrup—concl'd. ... (Gauhati subdivision— concl'd.) | 536 | Balisa'ra | 1 |
| | 539 | Borkhola | 1 |
| | 538 | Purna Doichapra | 1 |
| | 548 | Sonaiku'hi | 1 |
| | 781 | Shimoola | 1 |
| | 784 | Morawa | 1 |
| | 616 | Satgaon | 2 |
| | 631 | Bejara | 1 |
| | 629 | Malara | 2 |
| | 615 | Dakhin Mandukata | 4 |
| | 853 | Chormajuli | 1 |
| | 830 | Soru'a | 1 |
| | 834 | Sualkuchi | 1 |
| | 847 | Pachoria | 1 |
| | | <i>South Kamrup.</i> | |
| | 177 | Ajra | 1 |
| | 176 | Mirzapur | 1 |
| | 180 | Gog | 1 |
| | 257 | Rampur | 1 |
| | 256 | Nahira | 2 |
| | 246 | Chimua | 1 |
| | 339 | Kaimari | 1 |
| | 344 | Dawgaon | 1 |
| | 332 | Hilangjuly | 1 |
| | 551 | Aggumi | 1 |
| | 515 | Shamukh | 1 |
| | 307 | Satpur | 1 |
| | 132 | Rajapani Chanda | 6 |
| | 130 | Sojanpara | 2 |
| Barpeta subdivision ... | 10 | Jalikata | 1 |
| | 59 | Pipla | 1 |
| | 76 | Kulbari | 1 |
| | 92 | Tukrakochi | 1 |
| | 284 | Simla | 2 |
| | 157 | Bartarigaon | 1 |
| | 228 | Bhalaguri or Loasur | 1 |
| | 242 | Kolitapara | 2 |
| | ... | Bormanikpur | 2 |
| | | <i>Thana Sylhet.</i> | |
| Sylhet (North Sylhet subdivi- sion.) | ... | Mang lgaon | 1 |
| | ... | Purankalaruka | 2 |
| | | <i>Thana Gawainghat.</i> | |
| | ... | Barui | 2 |
| | | <i>Thana Jaintiapur.</i> | |
| | ... | Pach Senti | 1 |
| | ... | Gardana | 4 |
| | | <i>Thana Biswanath.</i> | |
| | ... | Daspaika | 5 |
| | ... | Alankari | 6 |
| | ... | Pewi | 4 |
| | ... | Kabilpur | 3 |
| | ... | Shimaiatollt | 2 |

APPENDIX IV—concluded.

List of villages found infected—concluded.

| District. | Serial No. | Names of villages. | No. of cases found. |
|--|------------|----------------------------|---------------------|
| 1 | 2 | 3 | 4 |
| | | <i>Thana Chhatak.</i> | |
| Sylhet—concl'd. ... (North Sylhet subdivision—concl'd.) | ... | Khairgaon | 5 |
| | ... | Naingaon | 2 |
| | ... | Majhergaon | 2 |
| | ... | Masimpur | 9 |
| | ... | Chesan | 2 |
| | ... | Rowli | 2 |
| | ... | Markool | 8 |
| | | <i>Thana Balaganj.</i> | |
| | ... | Isaguri | 3 |
| | | <i>Thana Sunamganj.</i> | |
| Sunamganj subdivision | ... | Horangaon | 1 |
| | ... | Jorogpur | 2 |
| | ... | Teghona | 3 |
| | ... | Mallikpur | 1 |
| | ... | Jalipur | 2 |
| | | <i>Thana Jagannathpur.</i> | |
| | ... | Rameswarpur | 4 |
| | | <i>Thana Jaldhup.</i> | |
| Karimganj subdivision | ... | Mathiura | 5 |
| | ... | Malipara | 4 |
| | ... | Barui | 1 |